

ACCESSION #: 9606110385

LICENSEE EVENT REPORT (LER)

FACILITY NAME: Donald C. Cook Nuclear Plant - Unit 2 PAGE: 1 OF 4

DOCKET NUMBER: 05000316

TITLE: Unit Trip Turbine Overspeed Testing Due to Lack of

Detailed Procedural Guidance

EVENT DATE: 05/08/96 LER #: 96-005-00 REPORT DATE: 06/07/96

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 07

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR  
SECTION:

50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

NAME: Robert Gillespie, Operations TELEPHONE: (616) 465-5901,

Superintendent x2535

COMPONENT FAILURE DESCRIPTION:

CAUSE: SYSTEM: COMPONENT: MANUFACTURER:

REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

At 1144 hours on May 8, 1996, during performance of the Main Turbine overspeed trip test and with the reactor at 7 percent power, a Reactor Protection System actuation was received. The actuation was the result of an anticipated Main Turbine overspeed trip signal coincident with an unanticipated indication on one out of two channels of turbine impulse pressure equivalent to turbine power of greater than 10 percent of full power. This report is being submitted in accordance with 10CFR50.73(a)(2)(iv), as an event that

resulted in actuation of an Engineered Safety Feature, including the Reactor Protection System.

This event was caused by a lack of detailed guidance in the overspeed trip test procedure. The lack of detail led to the improper operation of the operating device which resulted in a rapid increase in turbine impulse pressure and enabled the reactor trip from a main turbine trip circuit. When the turbine overspeed trip occurred, a reactor trip resulted.

All safety systems functioned as designed with the exception of three motor operated valves in lines from the East and West Motor Driven Auxiliary Feedwater pumps to Steam Generators 1, 3, and 4. These valves closed to their preset throttled position in response to spurious flow retention signals. These spurious signals were attributed to the rapid rise in system pressure when the two Motor Driven Auxiliary Feedwater pumps automatically started.

This event was evaluated and determined to have no adverse impact on the health and safety of the public.

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#### Conditions Prior to Occurrence

Unit 2 in Mode 1, Power Operations, at 7 percent Rated Thermal Power.

#### Description of Event

The Main Turbine (EHS/TA) overspeed test was being conducted to demonstrate the operability of the Main Turbine 110 percent and 112 percent overspeed trips. The test involved raising actual Main Turbine speed to 110 percent and 112 percent of the nominal 1800 RPM. Procedure

\*\*2-OHP 4030.STP.101 directed the operator as follows:

Step 8.4.9 Pull the operating device to the "Pull to Overspeed" position.

As no further detail was provided in the procedure, the operator assigned to control turbine speed during the test pulled the turbine operating device to the "pull to overspeed" position and held it there for

approximately 2 to 3 seconds. The Main Turbine accelerated and then tripped on overspeed as expected when turbine speed was approximately 2011 RPM. The turbine trip generated an unexpected reactor trip signal, resulting in the Reactor Protection System (EHS/JC) actuation. The reactor trip occurred at 1144 hours on May 8, 1996.

In response to the reactor trip signal, all control rods fully inserted, a Main Feedwater (EHS/SJ) isolation occurred and both Motor Driven Auxiliary Feedwater (MDAFW) (EHS/BA) pumps automatically started. Normal offsite power supplies remained in their pre-trip alignment, and decay heat was removed by dumping steam to the Main Condenser (EHS/KE) . No safety equipment was out of service at the time of the trip.

Operators implemented procedure 2-OHP 4023.E-0, Reactor Trip Response, to confirm and maintain safe, stable conditions. One of nine Main Condenser steam dump valves, 2-URV-130, failed to travel to the full closed position and was manually isolated within a few minutes of the trip. The low decay heat load from the recently refueled reactor, in conjunction with an excessive steam load that included the partially open steam dump valve, caused the Reactor Coolant System (EHS/AC) temperature to decrease below typical post-trip levels. This resulted in decreased pressurizer level and a letdown isolation. Normal pressurizer level was rapidly restored by the Control Room Operators.

All safety systems functioned as designed with the exception of three motor operated valves in lines from the East and West MDAFW pumps to

Steam Generators (SG) #s 1, 3, and 4. These valves went from full open to their pre-set throttled position in response to spurious flow retention signals. The fourth motor operated valve, in line to the #2 SG, operated as designed and remained in the full open position.

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#### Cause of Event

The cause of this event was lack of detailed procedural guidance for performance of the Main Turbine overspeed trip test.

During performance of the main turbine overspeed trip test using \*\*2-OHP 4030.STP.101, the operator pulled the turbine operating device to the "Pull to Overspeed" position in accordance with the step which read: Step 8.4.9 Pull the operating device to the "Pull to Overspeed" position

The operating device was maintained in the full out position until the turbine tripped on overspeed. The correct method for performing the overspeed test is to momentarily pull the operating device in several small "bumps" which allows the turbine to accelerate slowly.

Incorrect manipulation of the operating device caused the Main Turbine control valves to open faster and farther than expected, raising Main Turbine impulse pressure above the 10 percent set point. Impulse pressure is monitored by two channels, and when one of two instruments senses steam pressure equivalent to or greater than 10 percent power, the circuitry which causes a reactor protection system actuation from any

trip of the main turbine is enabled. In this case, when Main Turbine impulse pressure surged above the 10 percent power set point on 2-MPC-254, the reactor trip from turbine trip circuit was enabled, and the turbine trip generated by the overspeed test resulted in the reactor trip.

#### Analysis of Event

This event is being reported in accordance with 10CFR50.73(a)(2)(iv) as an event that resulted in actuation of engineered safety features, including the reactor protection system.

The event was a straightforward reactor trip event, which is bounded by analysis and is an expected occurrence during the operational life of the unit. The only safety system components which failed to function as designed were the three Auxiliary Feedwater valves which closed to a throttled position following the trip. This throttling function is designed to provide AFW pump protection under runout conditions. Each flow switch and associated flow retention circuitry will detect and respond to a high flow condition such as might be experienced if a Steam Generator is depressurized. When activated, the flow retention signal is sealed in and throttles the associated motor operated valve to a pre-determined position. In this throttled position the valves admit sufficient AFW flow to the SGs to maintain core cooling under post-trip or accident conditions. Post trip reviews confirmed that the Auxiliary Feedwater flow was adequate to satisfy the safety analyses and to protect

the pumps from runout conditions.

Post trip reviews of this event also included a review of the setpoint for the flow retention circuit which did not activate, evaluation of the system hydraulic characteristics and reviews of the plant parameters such as Steam Generator pressure at the time of the event. It was determined that no adverse impact was realized due to the spurious activation of the three flow switches combined with the fourth switch not activating.

This event was analyzed and it was determined that it did not endanger the health or safety of the public nor result in any adverse impact on the public.

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#### Corrective Action

The Main Turbine over speed trip test procedure, \*\*2-OHP 4030.STP.101, has been enhanced to provide specific direction to the operators regarding the correct method for operation of the turbine operating device during performance of the overspeed trip test.

As a precaution, the procedure for testing the Unit 1 Main Turbine overspeed trips was reviewed to ensure it did not contain problems similar to those which contributed to the Unit 2 event. The Unit 1 procedure was found to be accurate and of sufficient detail to preclude a similar event.

Additionally, operators have reviewed the event to ensure they are familiar with proper operation of the turbine operating device and

potential consequences of improper operation of the operating device.

In response to the spurious AFW flow retention signal, an investigation was performed. The spurious signal was determined to be the result of the rapid rise in system pressure when the two MDAFW pumps automatically started. No immediate corrective action was deemed necessary since the spurious activation of the AFW flow retention signals had no adverse impact. However, since the activation should not have occurred based on plant conditions existing at the time, a review of the AFW system requirements and design has been initiated. The objective of this review is to identify and implement changes to the system design and operating practices to enhance overall AFW system effectiveness including elimination of spurious activations and increasing operator flexibility in responding to plant transients. This review will be completed by August 15, 1996, after which an action plan will be developed for implementation.

In response to the steam dump to condenser valve failing to go fully closed, maintenance was performed on the valve actuator immediately following the trip. During the plant startup, the valve again failed to fully close, and was isolated. Further maintenance is scheduled for early June 1996. A safety review has been performed to evaluate the valve remaining isolated in the event the maintenance activities are not able to restore the valve. There are an additional eight steam dump valves so performance of the steam dump system is not significantly

affected by one valve being isolated.

Failed Component Identification

None

Previous Similar Events

316/92-007-00

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American Electric Power

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AEP

AMERICAN

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POWER

June 7, 1996

United States Nuclear Regulatory Commission

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Rockville, Maryland 20852

Operating Licenses DPR-74

Docket No. 50-316

Document Control Manager:



In accordance with the criteria established by 10 CFR 50.73 entitled  
Licensee Event Report System the following report is being submitted:

96-005-00

Sincerely,

A. A. Blind

Site Vice President

/clc

Attachment

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